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ANTICIPATIONS: AN EXPERIMENT IN PROPHECY.—I.

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I.—LOCOMOTION IN THE TWENTIETH CENTURY.

It is proposed in this series of papers to present in as orderly an arrangement as the necessarily diffused nature of the subject admits, certain speculations about the trend of present forces, speculations which, taken all together, will build up an imperfect and very hypothetical but sincerely intended forecast of the way things will probably go in this new century.

It is extremely convenient to begin with a speculation upon the probable developments and changes of the means of land locomotion during the coming decades. No one who has studied the civil history of the nineteenth century will deny how far-reaching the consequences of changes in transit may be.

The beginning of this twentieth century happens to coincide with a very interesting phase in that great development of means of land transit that has been the distinctive feature (speaking materially) of the nineteenth century. The nineteenth century, when it takes its place with the other centuries in the chronological charts of the future, will, if it needs a symbol, almost inevitably have as that symbol a steam engine running upon a

railway. This period covers the first experiments, the first great developments, and the complete elaboration of that mode of transit, and the determination of nearly all the broad features of this century's history may be traced directly or indirectly to that process. And since an interesting light is thrown upon the new phases in land locomotion that are now beginning, it will be well to begin this forecast with a retrospection, and to revise very shortly the history of the addition of steam travel to the resources of mankind.

It was, indeed, not one cause, but a very complex and unprecedented set of causes, set the steam locomotive going. It was indirectly that the introduction of coal became the decisive factor. One peculiar condition of its production in England seems to have supplied just one ingredient that had been missing for two thousand years in the group of conditions that were necessary before the steam locomotive could appear.

This missing ingredient was a demand for some comparatively simple, profitable machine, upon which the elementary principles of steam utilization could be worked out. It happened that the coal to replace the dwindling forests of this small and exceptionally rain-saturated country occurs in low, hollow basins overlying clay, and not, as in China and the Alleghanies, for example, on high-lying outcrops, that can be worked as chalk is worked in England. From this fact it followed that some quite unprecedented pumping appliances became necessary, and the thoughts of practical men were turned thereby to the long-neglected possibilities of steam. Steam had already been used for pumping upon one or two estates in England—rather as a toy than in earnest—before the middle of the seventeenth century. Savery, Newcomen, a host of other workers culminating in Watt, changed this toy of steam into a real, a commercial thing, developed a trade in pumping engines, created foundries and a new art of engineering, and almost unconscious of what they were doing, made the steam locomotive a well-nigh unavoidable consequence. At last, after a century of improvement on pumping engines, there remained nothing but the very obvious stage of getting the engine that had been developed on wheels and out upon the ways of the world.

Ever and again during the eighteenth century an engine would be put upon the roads and pronounced a failure—one

monstrous Palæoferrie creature was visible on a French high road as early as 1769—but by the dawn of the nineteenth century the problem had very nearly got itself solved. By 1804, Trevithick had a steam locomotive indisputably in motion and almost financially possible, and from his hands it puffed its way, slowly at first, and then, under Stephenson, faster and faster, to a transitory empire over the earth. It was a steam locomotive—but for all that it was primarily a *steam engine for pumping* adapted to a new end; it was a steam engine whose ancestral stage had developed under conditions that were by no means exacting in the matter of weight. It was all too huge and heavy for the high road—it had to be put upon rails.

Railway travelling is at best a compromise. The quite conceivable ideal of locomotive convenience is surely a highly mobile conveyance capable of travelling easily and swiftly to any desired point, traversing, at a reasonably controlled pace, the ordinary roads and streets, and having access for higher rates of speed and long-distance travelling to specialized ways restricted to swift traffic. Such a system would admit of that secular progress in engines and vehicles that the stereotyped conditions of the railway have almost completely arrested, because it would allow almost any conceivable new pattern to be put at once upon the ways without interference with the established traffic. Had such an ideal been kept in view from the first the traveller would now be able to get through his long-distance journeys at a pace of from seventy miles or more an hour without changing, and without any of the trouble, waiting, expense and delay that arise between the household or hotel and the actual rail.

But there was a more obvious path of development and one immediately cheaper, and along that path went short-sighted Nineteenth Century Progress. The first locomotives, apart from the heavy tradition of their ancestry, were needlessly clumsy and heavy, and their inventors, instead of working for lightness and smoothness of motion, took the easier course of placing them upon the tramways that were already in existence—chiefly for the transit of heavy goods over soft roads.

These tram-lines very naturally had exactly the width of an ordinary cart, a width prescribed by the strength of one horse. Few people saw in the locomotive anything but a cheap substitute for horseflesh, or found anything incongruous in letting the

dimensions of a horse determine the dimensions of an engine. It mattered nothing that from the first the passenger was ridiculously cramped, hampered and crowded in the carriage. He had always been cramped in a coach, and it would have seemed "Utopian" to propose travel without cramping. By mere inertia the horse-cart gauge, the four feet eight and one-half inch gauge, *nemine contradicente*, established itself in the world, and now everywhere the train is dwarfed to a scale that limits alike its comfort, power and speed.

This vast and elaborate railway system of ours, by which the whole world is linked together, is really only a vast system of trains of horse-wagons and coaches drawn along rails by pumping-engines upon wheels. Is that to remain the predominant method of land locomotion?

It is very doubtful if the railways will ever attempt any very fundamental change in the direction of greater speed or facility, unless they are first exposed to the pressure of our second alternative, competition, and we may go on to inquire how long will it be before that second alternative comes into operation.

The abounding presence of numerous experimental motors to-day is so stimulating to the imagination, there are so many stimulated persons at work upon them, that it is difficult to believe the obvious impossibility of most of them, their convulsive-ness, clumsiness, and (in many cases) exasperating trail of stench will not be rapidly fined away. I do not think that it is asking too much of the reader's faith in progress to assume that so far as a light, powerful engine goes, comparatively noiseless, smooth-running, not obnoxious to sensitive nostrils, and altogether suitable for high-road traffic, the problem will very speedily be solved. And upon that assumption, in what direction are these new motor vehicles likely to develop? how will they react upon the railways? and where finally will they take us?

At present they seem to promise developments upon three distinct and definite lines.

There will, first of all, be the motor truck for heavy traffic. Already such trucks are in evidence distributing goods and parcels of various sorts. And sooner or later, no doubt, the numerous advantages of such an arrangement will lead to the organization of large carrier companies, using such motor trucks to carry goods in bulk or parcels on the high roads.

In the next place, and parallel with the motor truck, there will develop the hired or privately owned motor carriage. This, for all except the longest journeys, will add a fine sense of personal independence to all the small conveniences of first-class railway travel. It will be capable of a day's journey of three hundred miles or more. One will change nothing—unless it is the driver—from stage to stage. One will be free to dine where one chooses, hurry when one chooses, travel asleep or awake, stop and pick flowers, turn over in bed of a morning and tell the carriage to wait—unless one sleeps aboard.

And, thirdly, there will be the motor omnibus, developing out of the horse omnibus companies and the suburban lines.

The motor omnibus companies competing against the suburban railways will find themselves hampered in the speed of their longer runs by the slower horse traffic on their routes, and they will attempt to secure, and, it may be, after tough legislative struggles, will secure the power to form private roads of a new sort, upon which their vehicles will be free to travel up to the limit of their very highest possible speed. It is along the line of such private tracks and roads that the forces of change will certainly tend to travel.

Once this process of segregation from the high road of the horse and pedestrian sets in, it will probably go on rapidly. The motor carrier companies competing in speed of delivery with the quickened railways will conceivably co-operate with the long-distance omnibus and the hired carriage companies in the formation of *trunk* lines.

These special roads will be very different from macadamized roads; they will be used only by soft-tired conveyances; the battering horseshoes, the perpetual filth of horse traffic, and the clumsy wheels of laden carts will never wear them. It may be that they will have a surface like that of some cycle-racing tracks, though since they will be open to wind and weather, it is perhaps more probable they will be made of very good asphalt sloped to drain, and still more probable that they will be of some quite new substance altogether. They will be just as wide as the courage of their promoters goes, and if the first made are too narrow there will be no question of gauge to limit the later ones. Their traffic in opposite directions will probably be strictly separated. The promoters will doubtless take a hint from suburban railway

traffic, and where their ways branch the streams of traffic will not cross at a level but by bridges. It is easily conceivable that once these tracks are in existence, cyclists and motors other than those of the constructing companies will be able to make use of them. And, moreover, once they exist it will be possible to experiment with vehicles of a size and power quite beyond the dimensions prescribed by our ordinary roads—roads whose width has been entirely determined by the size of a cart a horse can pull.

Countless modifying influences will, of course, come into operation. For example, it has been assumed, perhaps rashly, that the railway influence will certainly remain jealous and hostile to these growths. But once one of these specialized lines is in operation, it may be that some at least of the railway companies will hasten to replace their flanged rolling stock by carriages with rubber tires, remove their rails, broaden their cuttings and embankments, raise their bridges, and take to the new ways of traffic. Or they may find it answer to cut fares, widen their gauges, reduce their gradients, modify their points and curves, and woo the passenger back with carriages beautifully hung and sumptuously furnished, and all the convenience and luxury of a club.

And it may be that many railways, which are neither capable of modification into suburban motor tracks, nor of development into luxurious through routes, will find, in spite of the loss of many elements of their old activity, that there is still a profit to be made from a certain section of the heavy goods traffic, and from cheap excursions. There are forms of work for which railways seem to be particularly adapted, and which the diversion of a great portion of their passenger traffic would enable them to conduct even more efficiently.

It must always be remembered that at the worst the defeat of such a great organization as the railway system does not involve its disappearance until a long period has elapsed. It means at first no more than a period of modification and differentiation.

Almost certainly the existing lines of railway will develop and differentiate, some in one direction and some in another, according to the nature of the pressure upon them. Almost all will probably be still in existence and in divers ways busy a hundred years from now.

But in the discussion of all questions of land locomotion one must come at last to the knots of the network, to the central por-

tions of the towns, the dense, vast towns of our time, with their high ground-values and their narrow, already almost impossible streets. At present the streets of many larger towns present a quite unprecedented state of congestion. When the Green of some future *History of the English People* comes to review our times, he will, from his standpoint of comfort and convenience, find the present streets of London quite or even more incredibly unpleasant than are the filthy kennels, the mudholes and darkness of the streets of the seventeenth century to our enlightened minds. He will echo our question, "Why *did* people stand it?" He will be struck first of all by the omnipresence of mud, filthy mud, churned up by hoofs and wheels under the inclement skies, and perpetually defiled and added to by innumerable horses. "Just where the bicycle might have served its most useful purpose," he will write, "in affording a healthy daily ride to the innumerable clerks and such-like sedentary toilers of the central region, it was rendered impossible by the danger of side-slip in this vast ferocious traffic." And, indeed, to my mind at least, this last is the crowning absurdity of the present state of affairs, that the clerk and the shop hand, classes of people positively starved of exercise, should be obliged to spend yearly the price of a bicycle upon a season-ticket, because of the quite unendurable inconvenience and danger of urban cycling.

Now in what direction will things move in the matter? The first and most obvious thing to do, the thing that in many cases is being attempted and in a futile, insufficient way getting itself done, is the remedy of the architect and builder to widen the streets and to cut "new arteries." Now, every new artery means a series of new whirlpools of traffic, and unless colossal, or inconveniently steep, crossing-bridges are made, the wider the affluent arteries the more terrible the battle of the traffic. And there is the value of the ground to consider.

There is, however, quite another direction in which the congestion may find relief, and that is in the "regulation" of the traffic. This has already begun in London in an attack on the crawling cab and in the new by-laws of the London County Council, whereby certain specified forms of heavy traffic are prohibited the use of the streets between ten and seven. The presence of all the chief constituents of the vehicular torrent, the cabs and hansoms, the vans, the omnibuses—everything, indeed,

except the few private carriages—are as novel, as distinctively things of the nineteenth century, as the railway train and the needle telegraph. The streets of the great towns of antiquity, the streets of the great towns of the East, the streets of all the mediæval towns, were not intended for any sort of wheeled traffic at all—were designed primarily and chiefly for pedestrians.

But if one reflects, it becomes clear that, save for the vans of goods, this moving tide of wheeled masses is still essentially a stream of urban pedestrians, pedestrians who, by reason of the distances they have to go, have had to jump on 'buses and take cabs—in a word, to bring in the high road to their aid. And the vehicular traffic of the street is essentially the high-road traffic very roughly adapted to the new needs. The cab is a simple development of the carriage, the omnibus of the coach, and the supplementary traffic of the underground and electric railways is an adaptation of the long-route railway.

Now, the first most probable development is a change in the omnibus and the omnibus railway. A point quite as important with these means of transit as actual speed of movement is frequency. *The more frequent a local service, the more it comes to be relied upon.* Another point—and one in which the omnibus has a great advantage over the railway—is that it should be possible to get on and off at any point, or at as many points on the route as possible. But this means a high proportion of stoppages, and this is destructive to speed. There is, however, one conceivable means of transit that is not simply frequent but continuous, that may be joined or left at any point without a stoppage, that could be adapted to many existing streets at the level or quite easily sunken in tunnels, or elevated above the street level, and that means of transit is the moving platform. Let us imagine the inner circle of the District Railway adapted to this conception. I will presume that the Parisian “rolling platform” is familiar to the reader. The District Railway tunnel is, I imagine, about twenty-four feet wide. If we suppose the space given to six platforms of three feet wide and one (the most rapid) of six feet, and if we suppose each platform to be going four miles an hour faster than its slower fellow, we should have the upper platform running round the circle at a pace of twenty-eight miles an hour. If further we adopt an ingenious suggestion of Professor Perry's and imagine the descent to the line made down

a very slowly rotating staircase at the centre of a big rotating wheel-shaped platform, against a portion of whose rim the slowest platform runs in a curve, one could very easily add a speed of six or eight miles an hour more, and to that the man in a hurry would be able to add his own four miles an hour by walking in the direction of motion. If the reader is a traveller, and if he will imagine that black and sulphurous tunnel, swept and garnished, lit and sweet, with a train much faster than the existing underground trains perpetually ready to go off with him and never crowded—if he will further imagine this train a platform set with comfortable seats and neat bookstalls and so forth, he will get an inkling in just one detail of what he perhaps misses by living now instead of thirty or forty years ahead.

Will this diversion of the vast omnibus traffic of to-day into the air and underground, together with the segregation of van traffic to specific routes and times, be the only change in the streets of the new century? It may be a shock, perhaps, to some minds, but I must confess I do not see what is to prevent the process of elimination that is beginning now with the heavy vans spreading until it covers all horse traffic, and with the disappearance of horse hoofs and the necessary filth of horses, the road surface may be made a very different thing from what it is at present, better drained and admirably adapted for the soft-tired hackney vehicles and the torrent of cyclists.

II.—THE PROBABLE DIFFUSION OF GREAT CITIES.

The broad features of the redistribution of the population that has characterized the nineteenth century may be summarized as an unusual growth of great cities and a slight tendency to depopulation in the country. The growth of the great cities is the essential phenomenon. These aggregates having populations of from eight hundred thousand upward to four and five millions, are certainly, so far as the world outside the limits of the Chinese Empire goes, entirely an unprecedented thing.

Now, is this growth of large towns really, as we allege, a result of the development of railways in the world, or is it simply a change in human circumstances that happens to have arisen at the same time? It needs only a very general review of the conditions of the distribution of population to realize that the former is probably the true answer.

It will be convenient to make the issue part of a more general proposition, namely, that *the general distribution of population in a country must always be directly dependent on transport facilities*. To illustrate this point roughly we may build up an imaginary community by considering its needs. Over an arable country-side, for example, inhabited by a people who have attained agriculture, in which war was no longer constantly imminent, the population would, of course, be diffused primarily by families and groups in farmsteads. It might, if it were a very simple population, be almost all so distributed. But even the simplest agriculturists find a certain convenience in trade. Certain definite points would be convenient for such local trade and intercourse as the people found desirable, and here it is that there would arise the germ of a town.

Now, if this meeting place was more than a certain distance from any particular farm, it would be inconvenient for that farmer to get himself and his produce there and back and to do his business in a comfortable daylight; and, instead, he would either have to go to some other nearer centre to trade and gossip with his neighbors, or, failing this, not go at all. Evidently, then, there would be a maximum distance between such places. This distance in England, where traffic has been mainly horse traffic for many centuries, seems to have worked out, according to the gradients and so forth, at from eight to fifteen miles, and at each distance do we find the country towns, while the horseless man, the serf, and the laborer and laboring wench have marked their narrow limits in the distribution of the intervening villages. And so it is, entirely as a multiple of horse and foot strides, that all the villages and towns of the world's country-side have been plotted out.

A third, and almost final, factor determining town distribution in a world without railways, would be the seaport and the navigable river. Ports would grow into dimensions dependent on the population of the conveniently accessible coasts (or river banks), and on the quality and quantity of their products, and near these ports, as the conveniences of civilization increased, would appear handicraft towns, (the largest possible towns of a foot-and-horse civilization) with industries of such a nature as the produce of their coasts required.

And now to consider and work out the process of redistribu-

tion, which is, and for at least seven decades has been steadily in progress.

At the first sight, it might appear as though the result of the new developments was simply to increase the number of giant cities in the world by rendering them possible in regions where they had hitherto been impossible; but in all probability they are destined to such a process of dissection and diffusion as to amount almost to obliteration, so far, at least, as the blot on the map goes, within a measurable further space of years.

So far as we can judge without a close and uncongenial scrutiny of statistics, the daily journey that has governed and still to a very considerable extent governs the growth of cities, has had, and probably always will have, a maximum limit of two hours, one hour each way from sleeping place to council chamber, counter, workroom, or office stool. And taking this assumption as sound, we can state precisely the maximum area of various types of town. A pedestrian agglomeration, such as were probably in most of the European towns before the nineteenth century, would be swept entirely by a radius of four miles about the business quarter and the industrial centre. Of course, in the case of a navigable river, for example, the commercial centre might be elongated into a line and the circle of the city modified into an ellipse with a long diameter considerably exceeding eight miles, as, for example, in the instance of Hankow.

If, now, horseflesh is brought into the problem, an outer radius of six or eight miles from the centre will define a larger area in which the carriage folk, the hackney users, the omnibus customers, and their domestics and domestic camp followers may live and still be members of the city. Toward that limit London was already probably moving at the accession of Queen Victoria.

And then there came suddenly the railway and the steamship. For a time neither of these inventions was applied to the needs of intra-urban transit at all. For a time they were purely centripetal forces. They worked simply to increase the general volume of trade—to increase, that is, the pressure of population upon the urban centres. As a consequence the social history of the middle and later third of the nineteenth century, not simply in England but all over the civilized world, is the history of a gigantic rush of population into the magic radius of—for most people—four miles.

These new forces, at present still so potently centripetal in their influence, bring with them, nevertheless, the distinct promise of a centrifugal application that may be finally equal to the complete reduction of all our present congestions.

We are on the eve of a great development of centrifugal possibilities. And since it has been shown that a city of pedestrians is inexorably limited by a radius of about four miles, and that a horse-using city may grow out to seven or eight, it follows that the available area of a city which can offer a cheap suburban journey of thirty miles an hour is a circle with a radius of thirty miles. And is it too much, therefore, to expect that the available area for even the common daily toilers of the great city of the year 2000, or earlier, will have a radius very much larger even than that? Now, a circle with a radius of thirty miles gives an area of over 2,800 square miles, which is almost a quarter that of Belgium. But thirty miles is only a very moderate estimate of speed, and the available area for the social equivalent of the favored season-ticket holders of to-day will have a radius of over one hundred miles, and be almost equal to the area of Ireland. The radius that will sweep the area available for such as now live in the outer suburbs will include a still vaster area. Indeed, it is not too much to say that the vast stretch of country from Washington to Albany will be all of it "available" to the active citizen of New York and Philadelphia before that date.

This does not for a moment imply that cities of the density of our existing great cities will spread to these limits. The great city cannot grow, except as a result of some quite morbid and transitory process—to be cured at last by famine and disorder—beyond the area it commands commercially. Long before the population of this city, with its inner circle a third of the area of Belgium, rose toward the old-fashioned city density, this restriction would come in.

How far will this possible diffusion accomplish itself? Let us first consider the case of those classes that will be free to exercise a choice in the matter. What will be the forces acting upon the prosperous household, the household with a working head and four hundred pounds a year and upward to live upon, in the days to come? First, let us weigh the centrifugal attractions.

The first of these is what is known as the passion for nature, that passion for hillside, wind, and sea that is evident in so many

people nowadays, either frankly expressed or disguising itself as a passion for golfing, fishing, hunting, yachting, or cycling; and, secondly, there is the allied charm of cultivation, and especially of gardening. Through that we come to a third factor, that craving for a little private emporium such as a house or cottage "in its own grounds" affords; and from that we pass on to the intense desire so many women feel—and just the women, too, who will mother the future—their almost instinctive demand, indeed, for a separate sacred and distinctive household, built and ordered after their own hearts, such as in its fulness only the country-side permits. Add to these things the healthfulness of the country for young children, and the wholesome isolation that is possible from much that irritates, stimulates prematurely, and corrupts in crowded cities, and the chief positive centrifugal inducements are stated, inducements that no progress of inventions, at any rate, can ever seriously weaken. What now are the centripetal forces against which these inducements contend?

In the first place, there are a group of forces that will diminish in strength. There is at present the greater convenience of "shopping." All the inner and many of the outer suburbs of London obtain an enormous proportion of the ordinary household goods from half a dozen huge firms each of which has elaborated a very efficient system of taking orders and delivering goods. Collectively these great businesses have been able to overwhelm the small suburban general tradesman. But it is doubtful if the delivery organization of these great stores is any more permanent than the token coinage of the tradespeople of the last century. With the organization of a public parcels and goods delivery on cheap and sane lines in the place of our present complex, stupid, confusing, untrustworthy and fantastically costly chaos of post-office, railways and carriers, it is quite conceivable that Messrs. Omnium will give place again to specialized shops.

A second important centripetal consideration at present is the desirability of access to good schools and to the doctor. But access, be it noted, is another word for transit. It is doubtful if these two needs will so much keep people close to the great city centres as draw them together about secondary centres. New centres they may be in many cases; but also, it may be, in many cases the more healthy and picturesque of the existing small towns will develop a new life.

A third centripetal force is the love of the crowd; and closely allied to it is that love of the theatre which holds so many people in bondage to the Strand. Moreover, interweaving with these influences are other more egotistical and intenser motives, the love of dress, the love of the crush, the hot passion for the promenade. To a certain extent, this group of tendencies may lead to the formation of new secondary centres within the "available" area, theatrical and musical centres—centres of extreme Fashion and Selectness, centres of smartness and opulent display; but it is probable that for the large number of people throughout the world who cannot afford to maintain households in duplicate these will be for many years yet strictly centripetal forces, and will keep them within the radius marked by whatever will be the future equivalent in length of, say, the present two shilling cab ride in London.

Enough now has been said to determine the general nature of the expansion of the great cities in the future so far as the more prosperous classes are concerned.

And now how will the increase in the facilities of communication we have assumed affect the condition of those whose circumstances are more largely dictated by economic forces? The mere diffusion of a large portion of the prosperous and relatively free, and the multiplication of various types of road and mechanical traction, mean, of course, that in this way alone a perceptible diffusion of the less independent classes will occur. To the subsidiary centres will be drawn doctor and schoolmaster and various dealers in fresh provisions, baker, grocer, butcher; or, if they are already established there they will flourish more and more, and about them the convenient home of the future, with its numerous electrical and mechanical appliances, and the various bicycles, motor-cars, photographic and phonographic apparatus that will be included in its equipment will gather a population of repairers, "accessory" dealers and working engineers, a growing class which from its necessary intelligence and numbers may play a rather conspicuous part in the social development of the twentieth century. And the sons of the cottager within the affected area will develop into the skilled vegetable or flower gardeners, the skilled ostler (with some veterinary science), and so forth, for whom also there will evidently be work and a living. And dotted at every convenient position along the new roads, availing

themselves no doubt whenever possible of the picturesque inns that the old coaching days have left us, will be wayside restaurants and teahouses, and motor and cycle stores, and repair places. So much diffusion is practically inevitable.

In addition, as we have already intimated, many Londoners in the future may abandon the city office altogether, preferring to do their business in more agreeable surroundings. Such a business as book publishing, for example, has no unbreakable bonds to keep it in the region of high rent and congested streets. And the withdrawing publishers may very well take with them the printers and binders, and attract about them their illustrators and designers.

Publishing is, however, only one of the many similar trades equally profitable and equally likely to move outward to secondary centres with the development and cheapening of transit. It is all a question of transit.

The telephone will almost certainly prove a very potent auxiliary indeed to the forces making for diffusion. Consider all that lies within its possibilities. Almost all the labor of ordinary shopping can be avoided. The mistress of the house has all her local tradesmen, all the great London shops, the circulating library, the theatre box-office, the post-office and cab rank, the nurses' institute and the doctor, within reach of her hand. The business man may sit at home in his library and bargain, discuss, promise, hint, threaten, tell such lies as he dare not write, and in fact do everything that once demanded a personal encounter.

But the diffusion of the prosperous, independent and managing classes involves in itself a very considerable diffusion of the purely "working" classes also. Their centres of occupation will be distributed, and their freedom to live at some little distance from their work will be increased.

Enough has been said to demonstrate that old "town" and "city" will be, in truth, terms as obsolete as "mail coach." For these new areas that will grow out of them we want a term, and the administrative "urban district" presents itself with a convenient air of suggestion. We may for our present purposes call these coming town provinces "urban regions." Practically, by a process of confluence, the whole of Great Britain south of the Highlands seems destined to become such an urban region, laced all together not only by railway, telegraph and novel roads, but

by a dense network of telephones, parcels delivery tubes, and the like nervous and arterial connections.

III.—DEVELOPING SOCIAL ELEMENTS.

And now we come to consider the question of the general facies of the population that will be so distributed. The mere difference in thickness and facility of movement, alone, will involve consequences remarkable enough, as a later one of these papers will aim to show; but there are certain still broader features in the social order of the coming time, less intimately related to transit, that it will be convenient to concentrate upon at this stage. These are, essentially, outcomes of the enormous development of mechanism which has been the cardinal feature of the nineteenth century.

Throughout the world, for forty centuries, the more highly developed societies have always presented, under a considerable variety of superficial difference, certain features in common. Always at the base of the edifice, supporting all and subordinate to all—the most necessary of all—there has been the working cultivator, peasant, serf or slave. Save for a little water power, a little use of windmills, the traction of a horse or mule, this class has been the source of all the work upon which the community depends. And, moreover, whatever labor town developments have demanded has been supplied by the muscle of its fecund ranks. It was, in fact—and to some extent still is—the multitudinous, living machinery of the old social order; it carried, cropped, tilled, built and made. And, directing, and sometimes owning, this human machinery, there has always been a superior class, bound—usually by a point of honor—not to toil, often warlike, often equestrian and sometimes cultivated. These two primary classes may and do become in many cases complicated by subdivisions; the peasant class may split into farmers and laborers, the gentlemen admit a series of grades and orders—kings, dukes, earls and the like; but the broad distinction remained intact, as though it were a distinction residing in the nature of things.

From the very dawn of history until the first beginnings of organized mechanism in the eighteenth century, this simple scheme of orders was the universal organization of all but savage humanity; and the chief substance of all history, until these later years, has been, in essence, the perpetual endeavor of some organi-

zation based on this to attain, in every region, the locally suitable, permanent form against those two inveterate enemies of human stability, innovation and that secular increase in population that security permits. The imperfection of the means of communication rendered political unions of a greater area than that swept by a hundred mile radius highly unstable. It was a world of small states. Lax empires came and went; at the utmost, they were the linking of practically autonomous states under a common *Pax*. Wars were usually wars between kingdoms, conflicts of this local experiment in social organization with that. Through all the historic period, these few well defined classes acted and reacted upon each other. Until the coming of gunpowder, the man on horseback (commonly with some sort of armor) was invincible in battle in the open. Wherever the land lay wide and open and the great lines of trade did not fall, there the horseman was master—or the clerkly man behind the horseman. Such a land was aristocratic and tended to form castes. The craftsman sheltered under a patron and in guilds in a walled town, and the laborer was a serf. He was ruled over by his knight or by his creditor; in the end, it matters little how the gentleman began. But where the land became difficult by reason of mountain or forest, or where water greatly intersected it, the pikeman, or closer fighting swordsman, or the bowman, could hold his own, and a democratic flavor, a touch of repudiation was in the air.

Throughout, it was essentially one phase of human organization. When one comes to examine the final result, it is astonishing the small amount of essential change, of positively final and irreparable alteration in the conditions of the common life. Consider, for example, how entirely in sympathy was the close of the eighteenth century with the epoch of Horace, and how closely equivalent were the various social aspects of the two periods. The literature of Rome was living reading then, in a sense that has suddenly passed away. It was a commonplace of the thought of that time that all things recurred, all things circled back to their former seasons, there was nothing new under the sun. But now, almost suddenly, the circling has ceased, and we find ourselves breaking away. Correlated with the sudden development of mechanical forces that first began to be socially perceptible in the middle eighteenth century, has been the appearance of great

masses of population, having quite novel functions and relations in the social body; and, together with this appearance, such a suppression, curtailment and modification of the older class as to point to an entire disintegration of that system.

The most striking of the new classes to emerge is certainly the shareholding class, the owners of a sort of property new in the world's history.

Before the eighteenth century, the only property of serious importance consisted in land and buildings. These were "real" estate. Beyond these things were live stock, serfs and the furnishings of real estate, the surface aspect of real estate, so to speak, personal property, ships, weapons and the Semitic invention of money. All such property had to be actually "held" and administered by the owner; he was immediately in connexion with it and responsible for it. He could leave it only precariously to a steward and manager, for personal honesty is a much less trustworthy thing than a public standard of honesty; and to convey the revenue of it to him at a distance was a difficult and costly proceeding. To prevent a constant social disturbance by lapsing and dividing property, and in the absence of any organized agency to receive lapsed property, inheritance and preferably primogeniture were of such manifest advantage that the old social organization tended in the direction of these institutions. Such usury as was practiced relied entirely on the land and on the anticipated agricultural produce of the land.

But the usury and the sleeping partnerships of the Joint Stock Company system, which took shape in the eighteenth and the earlier half of the nineteenth century, opened quite unprecedented uses for money, and created a practically new sort of property and a new proprietor class. The peculiar novelty of this property is easily defined. Given a sufficient sentiment of public honesty, share property is property that can be owned at any distance, and that yields its revenue without thought or care on the part of its proprietor; it is, indeed, absolutely irresponsible property, a thing that no old world property ever was. But, in spite of its widely different nature, the laws of inheritance that the social necessities of the old order of things established have been applied to this new species of possession without remark. It is indestructible, irresponsible wealth, subject only to the mutations of value that economic changes bring about. Related in its

character of absolute irresponsibility to this shareholding class, is a kindred class that has grown with the growth of the great towns, the people who live upon ground rents. There is every indication that this element of irresponsible, independent and wealthy people in the social body, people who feel the urgency of no exertion, the pressure of no specific positive duties, is still on the increase and may still for a long time increasingly preponderate. They overshadow the responsible owner of real property or of real business altogether. Most of the old aristocrats, the old knightly and landholding people, have, so to speak, converted themselves into members of this new class.

It is a singularly ill defined class, a class with scarcely any specific characteristics beyond its defining one, of the possession of property and all the potentialities property entails, with a total lack of function with regard to that property. It is not even collected into a distinct mass. It graduates insensibly into every other class, it permeates society as threads and veins of gold permeate quartz.

It will be well to glance at certain considerations which point to the by no means self-evident proposition, that this factor of irresponsible property is certain to be present in the social body a hundred years hence. It has, no doubt, occurred to the reader that all the conditions of the shareholder's being unfit him for co-operative action in defense of the interests of his class. Since shareholders do nothing in common, except receive and hope for dividends, since they may be of any class, any culture, any disposition or any capacity, they will, one may anticipate, be incapable of any concerted action to defend the interest they derive from society against any resolute attack. Such crude and obvious denials of the essential principles of their existence as the various socialistic bodies have proclaimed, have, no doubt, encountered a vast, unorganized, negative opposition from them; but the subtle and varied attack of natural forces they have neither the collective intelligence to recognize nor the natural organization to resent. The question of the prolonged existence of this comparatively new social phenomenon turns, therefore, entirely on the quasi-natural laws of the social body.

Neglecting a few exceptional older corporations, which, indeed, in their essence are not usurious but of unlimited liability, the shareholding body appeared first in its present character in

the seventeenth century, and came to its full development in the mid-nineteenth. Was its appearance then due only to the attainment of a certain necessary degree of public credit, or was it correlated with any other force? It seems in accordance with facts to relate it to another force, the development of mechanism, so far as certain representative aspects go. Hitherto, the only borrower had been the farmer; then the exploring trader had found a world too wide for purely individual effort; and then suddenly the craftsman of all sorts, and the carriers, discovered the need of the new great, wholesale, initially expensive appliances that invention was offering them. It was the development of mechanism that created the great bulk of modern shareholding; it took its present shape distinctively only with the appearance of the railways. The hitherto necessary, but subordinate, craftsman and merchant classes were to have new weapons, new powers, they were to develop to a new importance, to a preponderance even in the social body. But before they could attain these weapons, before this new and novel wealth could be set up, it had to pay its footing in an apportioned world, it had to buy its right to disturb the established social order. The dividend of the shareholder was the tribute the new enterprise had to pay the old wealth.

If the great material developments of the nineteenth century had been final, if they had, indeed, constituted merely a revolution, and not an absolute release from the fixed conditions about which human affairs circled, we might even now be settling account with the shareholding ingredient as the socialists desire. But these developments were not final, and one sees no hint as yet of any coming finality. Invention runs free and our state is under its dominion. The statesman's conception of social organization is no longer stability but growth. And so long as material progress continues, this tribute must continue to be paid. Even if we "municipalize" all sorts of undertakings, we shall not alter the essential facts; we shall only substitute for the shareholder the corporation stockholder.

At the opposite pole of the social scale to that about which shareholding is most apparent, is a second necessary and quite inevitable consequence of the sudden transition that has occurred from a very nearly static social organization to a violently progressive one. This is the appearance of a great number of people

without either property or any evident function in the social organism. This new ingredient is most apparent in the towns, and is frequently spoken of as the Urban Poor; but its characteristic traits are to be found also in the rural districts. For the most part, its individuals are either criminal, immoral, parasitic in more or less irregular ways upon the more successful classes, or laboring at something less than a regular bare-subsistence wage, in a finally hopeless competition against machinery that is as yet not so cheap as their toil. It is, to borrow a popular phrase, the "submerged" portion of the social body, a leaderless, aimless multitude, a multitude of people drifting down toward the Abyss.

Whatever may be done to mitigate or conceal the nature of this element, it remains in its essence, wherever social progress is being made, the contingent of death. Humanity has set out in the direction of a more complex and exacting organization; and until, by a foresight to me at least inconceivable, it can prevent the birth of just all the inadaptable, useless or merely unnecessary creatures in each generation, there must needs continue to be this individually futile struggle beneath the feet of the race; somewhere and in some form, there must still persist those essentials that now take shape as the slum, the prison and the asylum.

The appearance of these two strange, functionless elements is by no means the most essential change in progress. The old upper class, as a functional member of the state, is being effaced. The old lower class, the broad necessary base of the social pyramid, the uneducated, unadaptable peasants and laborers, is with the development of toil-saving machinery dwindling and crumbling down bit by bit toward the Abyss. But side by side with these two processes is a third process of still profounder significance, and that is the reconstruction and the vast proliferation of what constituted the middle class of the old order. It is now, indeed, no longer a middle class at all. Rather all the definite classes, in the old scheme of functional precedence, have melted and mingled, and in the molten mass there has appeared a vast intricate confusion of different sorts of people, some sailing about upon floating masses of irresponsible property, some buoyed by smaller fragments, some clinging desperately enough to insignificant atoms, a great and varied multitude swimming successfully without aid or with an amount of aid that is negligible in relation to their own efforts, and an equally varied multitude of less

capable ones clinging to the swimmers, clinging to the floating rich, or clutching empty-handed, and thrust or sinking down.

It will be obvious that the interest of this speculation at any rate centres upon this great intermediate mass of people who are neither passively wealthy, the sleeping partners of change, nor helplessly thrust out of the process. Indeed, from our point of view, these non-effective masses would have but the slightest interest, were it not for their enormous possibilities of reaction upon the really living portion of the social organism. This really living portion seems at first sight to be as deliquescent in its nature, to be drifting down to as chaotic a structure as either the non-functional owners that float above it, or the non-functional unemployed who sink below. What were once the definite subdivisions of the middle class modify and lose their boundaries. The retail tradesman of the towns, for example—once a fairly homogeneous class throughout Europe—expands here into vast store companies, and dwindles there to be an agent or collector, seeks employment or topples outright into the Abyss. But one can detect here that there are other processes by which men are being segregated into a multitude of specific new groups which may develop very distinctive characters and ideals.

There are, for example, the unorganized myriads that one can cover by the heading "mechanics and engineers," if one uses it in its widest possible sense. At present, it would be almost impossible to describe a typical engineer. The black-faced, oily man one figures emerging from the engine room serves well enough, until one recalls the sanitary engineer with his additions of crockery and plumbing, the electrical engineer with his little tests and wires, the mining engineer, the railway maker, the motor builder and the irrigation expert. Consider the rude levy that is engaged in supplying and repairing the world's new need of bicycles! Individuals from all the older aspects of engineering have been caught up by the new development, are all now, with a more or less inadequate knowledge and training, working in the new service. But is it likely that it will remain a rude levy? From all these varied people the world requires certain things, and a failure to attain them involves sooner or later, in this competitive world, an individual replacement and a push toward the Abyss. The very lowest of them must understand the machine they contribute to make and repair. They must

keep on mastering new points, new aspects; they must be intelligent and adaptable; they must get a grasp of that permanent something that lies behind the changing immediate practice; so far, they must be educated, rather than trained after the fashion of the old craftsman. Just now this body of irregulars is threatened by the coming of the motors. The motors promise new difficulties, new rewards and new competition. It is an ill look out for the cycle mechanic who is not prepared to tackle the new problems that will arise. For all this next century, this particular body of mechanics will be picking up new recruits, and eliminating the incompetent and the rule of thumb sage. Can it fail, as the years pass, to develop certain general characters, to become so far homogenous as to be generally conscious of the need of a scientific education, and to possess, down to its very lowest ranks and orders, a common fund of intellectual training?

But the makers and repairers of cycles, and that larger multitude that will presently be concerned with motors, are, after all, only a small and specialized section of the general body of mechanics and engineers. Every year, with the advance of invention, new branches of activity, that change in their nature and methods all too rapidly for the establishment of rote and routine workers of the old type, call together fresh levies of amateurish workers and learners, who must surely presently develop into or give place to bodies of qualified and capable men. Throughout all its ramifications and ranks this new, great and expanding body of mechanics and engineers will tend to become an educated and adaptable class, in a sense in which the craftsmen of former times were not educated and adaptable. Here we have at least the possibility, the primary creative conditions, of a new, numerous, intelligent, educated and capable social element.

What are the chief obstacles in the way of the emergence, from out the present chaos, of this social element in the next hundred years? In the first place, there is the spirit of trade unionism. Trade unions arise under the traditions of the old order, when, in every business, employer and employed stood as a special instance of the universal relationship between gentle or intelligent, who supplied no labor, and simple who supplied nothing else. The interest of the employer was to get as much labor as possible out of his hirelings; the compensating object in life of the hireling, whose sole function was drudgery, was to

give as little to his employer as possible. In the older trades, these traditions have practically arrested any advance whatever. There can be no doubt that their influence has spread into what are practically new branches of work. Even where new conveniences have called for new types of workmen, and have opened the way for the elevation of a group of laborers to the higher level of versatile educated men, the old traditions have to a very large extent prevailed. The average sanitary plumber of to-day in England insists upon his position as a mere laborer as though it were some precious thing, he guards himself from improvements as a virtuous woman guards her honor, he works for specifically limited hours and by the hour with specific limitations in the practice of his trade, on the fairly sound assumption that but for that restriction any fool might do plumbing as well as he does and so lower his wretched standard of comfort. Whatever he learns he learns from some other plumber during his apprenticeship years, after which he devotes himself to doing the minimum of work in the maximum of time.

At present, however, I am dealing not with the specific community but with the generalized civilized community of A. D. 2000; and for that emergent community, wherever it may be, it seems reasonable to anticipate the replacing of the classes of common workmen and mechanics of to-day by a large, fairly homogenous body of more or less expert mechanics and engineers, with a certain common minimum of education and living intelligence, and a common consciousness—a new body, a new force, in the world's history. For this body to exist, implies the existence of much more than the primary and initiating nucleus of engineers and skilled mechanics. If it is an educated class, its existence implies a class of educators, and just as far as it does get educated the schoolmasters will be skilled and educated men. The shabby-genteel middle class schoolmaster of the England of to-day in (or a little way out of) orders, with his smattering of Greek, his Latin that leads nowhere, his fatuous mathematics and his gross ignorance of pedagogics, certainly does not represent the schoolmaster of this coming class.

The future spells variation. The practical abolition of impossible distances over the world will tend to make every district specialize in the production for which it is best fitted. The chief opposing force to this tendency will be found in those coun-

tries where the tenure of the land is in small holdings. A population of small agriculturalists that has really got itself well established is probably as hopelessly immovable a thing as the forces of progressive change will have to encounter. But I do not see how they will obstruct, more than locally, the reorganization of agriculture and horticulture upon the ampler and more economical lines mechanism permits, or prevent the development of a type of agriculturalist as adaptable, alert, intelligent, unprejudiced and modest as the coming engineer. The development of more and more scientific engineering and really adaptable operatives will render possible agricultural contrivances that are now only dreams.

Another great section of the community will also fall within the attraction of this possible synthesis, and will inevitably undergo profound modification—the military element. Of the probable development of warfare, a later chapter shall treat; and here it will suffice to point out that at present science stands proffering the soldier vague, vast possibilities of mechanism, and that so far he has accepted practically nothing but rifles which he cannot sight, and guns that he does not learn to move about. It offers him transport that he does not use, maps he does not use, entrenching devices, road-making devices, balloons and flying scouts, portable foods, security from disease, a thousand ways of organizing the horrible uncertainties of war. But the soldier of to-day (I do not mean the British soldier only) still insists on regarding these revolutionary appliances as mere accessories, and untrustworthy ones at that, to the practice of his art.

Almost all discussion of military matters still turns upon the now quite stupid assumption that there are two primary military arms, and no more, horse and foot. "Cyclists are infantry," the War Office manual of 1900 gallantry declares in the face of this changing universe. After fifty years of railways, there still does not exist a skilled and organized body of men, specifically prepared to seize, repair, reconstruct, work and fight such an important element in the new social machinery as a railway system.

But, sooner or later, the new sort of soldier will emerge, a sober, considerate engineering man—no more of a gentleman than his subordinate or any other self-respecting person.

Here, then (in the vision of the present writer), are the **main**

social elements of the coming time; (1.) the element of irresponsible property; (2.) the helpless superseded poor, that broad base of toilers, now no longer essential; (3.) a great inchoate mass of more or less capable people, engaged more or less consciously in applying the growing body of scientific knowledge to the general needs; and a possibly equally great number of non-productive persons living in and by the social confusion.

All these elements are developing under the stimulus of mechanical developments, and with the bandages of old tradition hampering their movements. The laws they obey, the governments they live under are for the most part laws made and governments planned before the coming of steam. The areas of administration are still areas marked out by conditions of locomotion as obsolete as the quadrupedal method of the pre-arboreal ancestor.

This being so, a large part of the history of the coming years must assuredly consist of more or less conscious endeavors to adapt these obsolete and obsolescent contrivances for the management of public affairs to the new and continually expanding and changing requirements of the social body. There are here no signs of a millennium. Internal reconstruction, while men are still limited, egotistical, passionate, ignorant and ignorantly led, means sedition and revolution, and the rectification of frontiers means wars.

H. G. WELLS.

(To be continued.)